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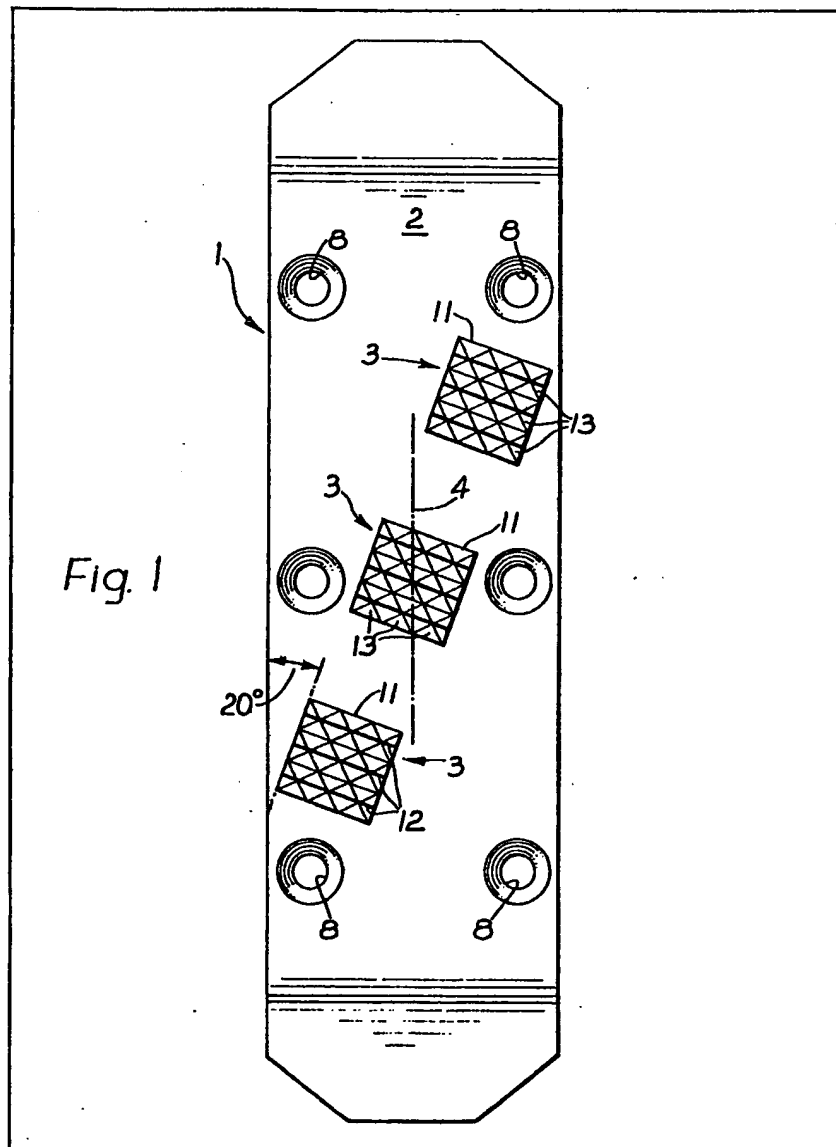
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(54) Brake shoe assembly

(57) A brake shoe assembly 1 for a rail vehicle, comprises a backing plate 2 and at least one brake shoe 3 carried thereby, the or each shoe 3 having a multiplicity of teeth 13 formed of or incorporating hard material (e.g. tungsten carbide), the teeth 13 projecting from their shoe 3 and being adapted, in the braking condition, to engage an adjacent railway rail, each tooth 13 being so positioned that no

tooth 13 on the shoe 3 is located in front of, or behind another tooth 13 on the shoe 3, with respect to the direction of braking. The avoidance of tooth alignment ensures that each tooth has a braking effect rather than following in a groove ploughed by another tooth.

As shown, three shoes 3 (of mild steel) have circular mounting projections (9) fitting holes (7) in plate 2 and secured by weld metal (10). Details of the formation of nine teeth 13 on each shoe are given.



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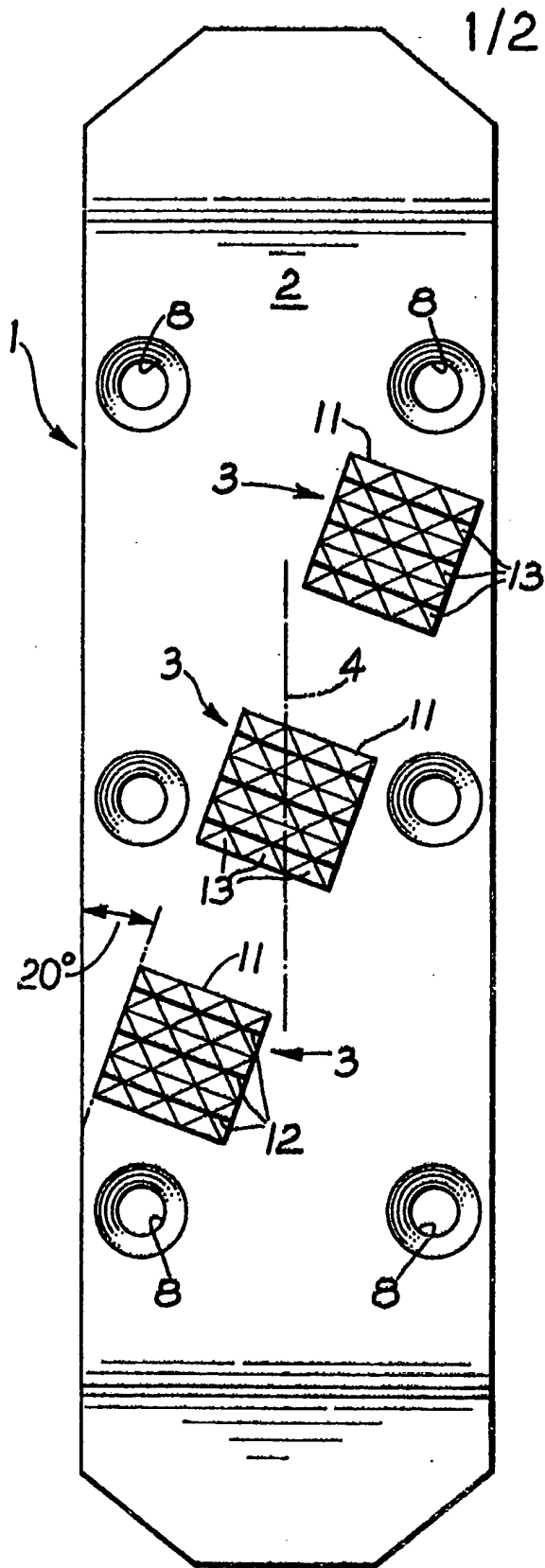


Fig. 1

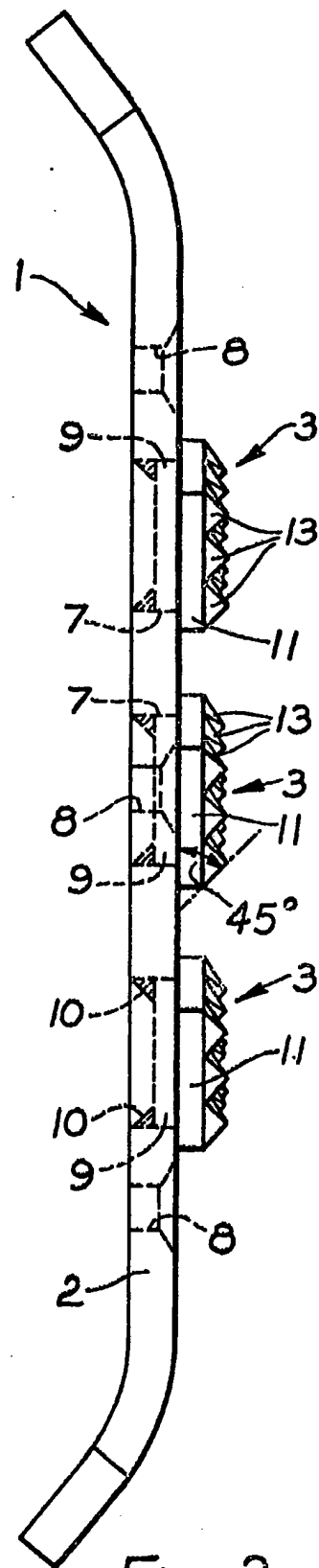


Fig. 2

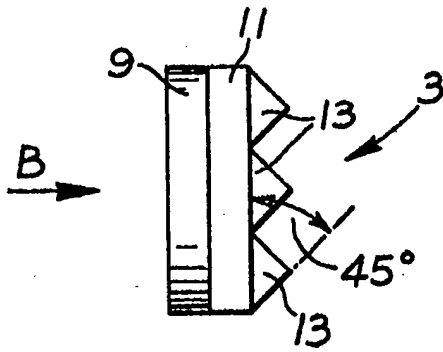


Fig. 3

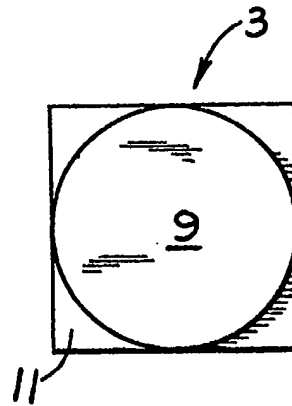


Fig. 4

SPECIFICATION

Brake shoe assembly

This invention relates to a brake shoe assembly for a rail vehicle and in particular for a rail vehicle
 5 operating in wet or dirty conditions e.g. in an underground mine.

Conventionally, brake shoes are of friction material e.g. cast iron, Ferodo (Trade Mark), sintered bronze, but in the wet and/or slimy
 10 conditions frequently encountered underground, and having regard to the gradients frequently encountered underground, friction brakes are usually operable with a much reduced braking effect, if in fact they are capable of producing any
 15 braking effect whatsoever, on the vehicle to which they are fitted.

According to the present invention, there is provided a brake shoe assembly for a rail vehicle comprising a backing plate and at least one brake
 20 shoe carried thereby, the or each shoe having a multiplicity of teeth formed of or incorporating hard material, the teeth projecting from their shoe and being adapted, in the braking condition, to engage an adjacent railway rail, and each tooth
 25 being so positioned that no tooth is located in front of, or behind, another tooth, with respect to the direction of braking.

Thus, when a brake shoe assembly in accordance with the invention is put into the
 30 braking condition, the projecting teeth of the shoe penetrate any surface slime, water etc. on the adjacent rail, while the avoidance of tooth alignment ensures that each tooth is capable of having a braking effect rather than following in a
 35 groove ploughed by a preceding tooth, and the vehicle to which the shoe assembly is attached is braked by the projecting teeth causing in fact plastic flow of the rail head material around the teeth, and in particular the tips thereof. Under
 40 normal conditions and loads this results in the rail heads becoming grooved to a depth of approximately 0.010 in, but such small grooves are generally rolled out again by passage of the rail wheels. Tests have shown that the brake shoe
 45 assembly in accordance with the invention produces an apparent coefficient of friction of 0.375 μ , while the tips of the teeth are self-cleaning and are readily capable of negotiating joints in the railway rails.

Each tooth preferably has a negative rake angle which minimises any cutting effect on the rail whilst improving tooth life. Conveniently, the teeth incorporate tungsten carbide. In detail, the or each
 50 brake shoe may be produced in steel, by casting or by machining from bar stock, with a slot subsequently milled into the shoe to receive a strip of tungsten carbide which is located by brazing. The teeth may be produced by grinding, before or after insertion of the strip(s) of tungsten carbide. In
 55 a preferred embodiment, the or each brake shoe has a square, tooth carrying head provided with nine teeth and three, spaced apart, parallel milled slots each housing a strip of tungsten carbide of any suitable cross-section. It is also preferred for

the backing plate to be elongate and to be
 65 apertured at various locations to receive mounting projections of each brake shoe. The apertures may for instance be circular holes, in which case the mounting projections are of corresponding circular
 70 section. The or each brake shoe may be secured to its backing plate by welding. An underside of the square tooth-carrying head of the or each brake shoe may abut against an adjacent face of the backing plate. Non-alignment of teeth may be
 75 effected by angling the strip(s) or the brake shoe with respect to the direction of braking. Thus for a nine tooth, square headed shoe, a side edge of the shoe may be located at 15° to 30° to the longitudinal axis of the body member. It is also
 80 preferred for the negative rake angle to be of the order of 45° which gives a desired self-cleaning effect and which also provides maximum strength at the tips of the teeth thereby precluding chipping of the teeth when the tips thereof negotiate a rail
 85 joint. In one embodiment, three brake shoes are carried by each backing plate. These may be arranged such that a central brake shoe is located on the longitudinal axis of the backing plate, to provide the normal braking effect while the other
 90 brake shoes are located above and below this axis, one forwardly and one rearwardly of the central brake shoe, for braking when the associated vehicle negotiates a curve in the railway rails.

The invention will now be described in greater
 95 detail, by way of example, with reference to the accompanying drawings, in which:—

Figure 1 is a front view of a brake shoe assembly in accordance with the invention;

Figure 2 is a side view of Figure 1;

100 Figure 3 is a side elevation on a brake shoe of Figures 1 and 2; and

Figure 4 is a view in the direction of arrow B of Figure 3.

In the drawings, a brake shoe assembly 1
 105 comprises basically a backing plate 2 and three brake shoes 3.

As can be seen in Figure 3, the backing plate 2 is elongate, having a longitudinal axis 4, parallel long sides 5 and ends 6. Three circular holes are provided in the backing plate 2, one hole 7 being a
 110 central hole located on the longitudinal axis 4 midway between the ends 6, while the other two holes 7 are located one to each side of the longitudinal axis 4, one nearer to each end 6 than the central hole. The backing plate 2 is also
 115 provided with six holes 8 by which it is mounted, using countersunk screws, on a brake actuating mechanism (not shown).

As can be seen in Figures 5 and 6, each brake
 120 shoe 3, e.g. of mild steel, comprises a circular section mounting projection 9 of diameter to fit a hole 7 and is secured in position on the backing plate by weld metal 10 (see Figure 2). Each brake shoe 3 also comprises a square head 11 into
 125 which are milled three slots each to receive a strip 12 of tungsten carbide brazed into position, each head 11 being ground to form nine teeth 13 with the tungsten carbide at their tips and having a 45° negative rake angle. In order that no tooth 13 shall

- be in front of or behind, another tooth, with respect to the direction of braking, and hence so that all nine teeth 13 shall have a braking effect, then as shown in Figure 1, the brake shoes 3 are
- 5 welded to the backing plate 2 with a 20° angle between an adjacent side of the square head 11 and a long side 5 of the backing plate 2, or conversely between any strip 20 and a line transverse to the direction of braking i.e.
- 10 transverse to the longitudinal axis of the backing plate 2.

CLAIMS

1. A brake shoe assembly for a rail vehicle comprises a backing plate and at least one brake shoe carried thereby, the or each shoe having a multiplicity of teeth formed of or incorporating hard material, the teeth projecting from their shoe and being adapted, in the braking condition, to engage an adjacent railway rail, and each tooth
- 20 being so positioned that no tooth is located in front of, or behind, another tooth, with respect to the direction of braking.
2. An assembly as claimed in Claim 1, wherein each tooth has a negative rake angle.
- 25 3. An assembly as claimed in Claim 1 or Claim 2, wherein the teeth incorporate tungsten carbide.
4. An assembly as claimed in any preceding Claim, wherein the or each brake shoe is of steel.
- 30 5. An assembly as claimed in any preceding Claim, wherein the or each brake shoe is produced by casting or machining from bar stock.
6. An assembly as claimed in Claim 4 and any Claim appendant thereto, wherein the teeth are
- 35 produced by grinding.
7. An assembly as claimed in any preceding Claim, wherein the or each brake shoe has a slot to receive a strip of tungsten carbide which is located by brazing.
- 40 8. An assembly as claimed in Claim 7, wherein the or each brake shoe has a square tooth-carrying head provided with nine teeth and three, spaced apart, parallel milled slots.
9. An assembly as claimed in any preceding Claim, wherein the backing plate is elongate.
- 45 10. An assembly as claimed in Claim 9, wherein the backing plate is apertured at various locations to receive mounting projections of the or each brake shoe.
- 50 11. An assembly as claimed in Claim 10, wherein the apertures are circular holes, in which case the mounting projections are of corresponding circular section.
12. An assembly as claimed in Claim 10 or
- 55 Claim 11, wherein the or each brake shoe is secured to its backing plate by welding.
13. An assembly as claimed in Claim 8 and any Claim appendant thereto, wherein an underside of the square tooth-carrying head of the or each
- 60 brake shoe, abuts against an adjacent face of the backing plate.
14. An assembly as claimed in Claim 7, and any Claim appendant thereto, wherein the strip(s) or the or each shoe is angled with respect to the
- 65 direction of braking.
15. An assembly as claimed in Claim 14, wherein the angling of the strip(s) is at 15°—30° to a line transverse to the direction of braking.
16. An assembly as claimed in any preceding
- 70 Claim, wherein the teeth rake angle is of the order of 45°.
17. An assembly as claimed in any preceding Claim, wherein three brake shoes are carried by each backing plate.
- 75 18. An assembly as claimed in Claim 15, wherein a central brake shoe is located on the longitudinal axis of the backing plate, while the other brake shoes are located above and below this axis, one forwardly and one rearwardly of the central brake shoe.
- 80 19. A brake shoe assembly for a rail vehicle, substantially as hereinbefore described with reference to the accompanying drawings.